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Diverging Trends in National and Local Concentration

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I. Introduction

Most product markets are local. The reason is simply that the transportation of goods and people is costly so firms set up production plants, distribution centers, and stores close to customers. In turn, individuals locate in areas where they can obtain the goods they desire. A coffee shop or restaurant in Manhattan does not compete with similar establishments in Seattle and probably not even in Brooklyn. The wedge in prices created by the inconvenience and monetary cost of buying a product far away from the desired consumption point shields companies in different locations from direct competition. Of course, the size of these costs and, therefore, the geographic extent of the market vary by product. Markets are also product specific. Producers of a particular product are shielded from competition by producers of distinct but related goods and services to the degree that their consumption requires households to move away from their ideal variety.

  Much has been written recently about the increase in national market concentration observed over the last 2 decades and the role that large national firms have played in driving this trend. The evidence for the rise in concentration is uncontroversial; the shares of the largest firms and the Herfindahl-Hirschman Index (HHI), among other measures of concentration, have increased consistently in most sectors since 1990.[1] A narrative has emerged whereby this increase in national concentration is perceived as the cause of lower product-market competition. This fall in competition is then viewed as the culprit of other apparent trends, such as rising markups and market power (Gutiérrez and Philippon 2017; Hall 2018; De Loecker,

Eeckhout, and Unger 2020), the increasing profits of large firms (Barkai 2020), declining labor market dynamism and firm entry (Decker et al. 2017), and declining wages and declining labor share (e.g., Autor et al. 2017).[2] Some studies have called into question the interpretation of these facts as evidence of increasing market power (see Hopenhayn, Neira, and Singhania 2018; Syverson 2019), and the empirical robustness and validity of some of these trends have also been contested in recent work.[3] However, the uncontroversial rise in national market concentration remains as the main empirical foundation of this central narrative.

In this paper, we use the National Establishment Time Series (NETS) data set to document four main facts regarding national and local product-market concentration in the US economy between 1990 and 2014. The first fact is that the observed positive trend in market concentration at the national level has been accompanied by a corresponding negative trend in average local market concentration. We measure concentration using the HHI, but our findings hold for a variety of statistics. We observe an increase in concentration at the national level overall across the vast majority of sectors and industries but a fall in concentration when it is measured at the core-based statistical area (CBSA), county, or ZIP code levels.[4] The narrower the geographic definition, the faster is the decline in local concentration. This is meaningful because the relevant definition of concentration from which to infer changes in competition is, in most sectors, local and not national.

The second fact shows that local concentration is falling across Standard Industrial Classification (SIC) 8 industries that together account for 78% of employment and 72% of sales. Furthermore, conditioning on industries where national concentration is rising, industries where local concentration has declined account for the majority of employment overall (72% of employment and 66% of sales) across all major sectors. The presence of these diverging trends is always large but more pronounced in Services, Retail Trade, and Finance, Insurance, and Real Estate (FIRE) sectors relative to Wholesale Trade and Manufacturing. This ordering is natural given that transport costs are less relevant in the latter two sectors. Together, these first two facts underscore an unmistakable decline in local concentration on average that is pervasive across all sectors.

How does one reconcile a positive trend in national concentration with a negative trend in local concentration? The third fact shows that, among SIC 8 industries exhibiting this pattern, top firms have accelerated these trends. That is, excluding the top firm in each industry (in terms of national sales in their SIC 8 industry in 2014), the national increase in concentration

becomes naturally less pronounced. Perhaps more surprisingly, the decline in local concentration also becomes less pronounced. Put another way, large firms have materially contributed to the observed decline in local concentration.[5] Among industries with diverging trends, large firms have become bigger but the associated geographic expansion of these firms, through the opening of more plants in new local markets, has lowered local concentration thus suggesting increased local competition. In the considerably smaller set of industries where we observe increases in both national and local concentrations, top firms have also been responsible for both forms of concentration.

The fourth fact establishes that among industries with falling local concentration, the opening of a plant by a top firm is associated with a decline in local concentration at the time of the opening and that this lower level of concentration persists for at least 7 years. This observation provides further evidence that in those industries, large enterprises do not enter and dominate the local market but instead lower its concentration, either by competing with the previous local monopolist or by simply adding one more establishment that grabs a proportional market share from other local establishments. In any case, the notion that entry by large firms eliminates local producers to the point of increasing concentration is certainly not supported in the vast majority of industries where most of US employment resides.

Consider the much publicized case of Walmart. Most of Walmart's establishments are in the discount department stores industry, an industry with declining local concentration. Consistent with the fourth fact listed earlier, when Walmart opens a store, the HHI falls by 0.15 in the associated ZIP code. In contrast, computing the HHI without taking into account the opening of a Walmart establishment, concentration remains constant. One can also consider the effect of Walmart on the number of firms in a market. When Walmart enters an area, the total number of establishments in the ZIP code increases, though by less than one to one (i.e., about three to four). In other words, Walmart generates some exit but the net result of opening a Walmart store is a greater number of competitors in the market for at least 7 years after entry.[6] This case is paradigmatic, but there are many others across all major sectors. For example, the expansion of Cemex, the top firm by sales in 2014 in the ready-mixed concrete industry, led to a similar decline in local concentration and an expansion in the local number of establishments in the industry.[7]

Our findings challenge the view that product-market concentration is increasing in the United States. They do so not by challenging the evidence

that national concentration has increased—we actually provide additional evidence to that effect across many industries—but by observing that this national trend does not imply a positive local trend in concentration. In fact, we show that it implies the opposite in most industries, a declining trend in concentration. Ultimately, concentration matters because it can lead to less competition. Hence, measures of concentration have to be aligned with product markets as well as their geographic and industrial scope. In particular, for the majority industries, concentration is likely more relevant to firm pricing and other strategic behavior at a more local level. Our findings are also consistent with the mixed evidence found in recent literature regarding secular changes in markups across individual industries. If local competition matters, we should not see increases in markups or profits in the markets where local competition is increasing. The measurement of markups in local markets associated with particular industries depends on important assumptions and requires very detailed data. The NETS data do not allow us to calculate these local statistics, but there exists evidence of flat markups over time in specific industries with declining concentration (Anderson, Rebelo, and Wong 2018) and in the aggregate (Traina 2018). Finally, our results are also consistent with recent papers contending that labor market concentration is falling in the US economy (Rinz 2018; Berger, Herkenhoff, and Mongey 2019; Hershbein, Macaluso, and Yeh 2019).[8] In contrast to these studies, we demonstrate the contribution of top firms, including in specific examples such as Walmart, to the divergence between the national and local concentration measures.

The NETS data set covers the universe of US firms and their plants.[9] The data set includes sales and employment numbers of all plants at different levels of geographic and industrial disaggregation down to the SIC 8 product code. Neumark, Zhang, and Wall (2006) and Barnatchez, Crane, and Decker (2017) provide thorough discussions of the advantages and disadvantages of this data source relative to US Census data. The next section discusses many of these and the extent to which they are relevant for our findings. In particular, we show that for the industries covered in our study, the geographic distribution of employment in the data is very highly correlated with that in the US Census and, moreover, that this correlation is stable over time. Our findings, therefore, cannot be driven by changes in data coverage, accuracy, or the speed of updates. The small discrepancies we find between NETS and standard Census data sources can evidently not explain the variety of consistent patterns revealed in the data. In addition, a critical feature of the NETS data integral to our analysis is that the data set allows researchers to explore and share the role of

individual enterprises in shaping changes in industry concentration. This defining characteristic of NETS, therefore, permits explorations that would otherwise be infeasible with Census data.

The facts we document are directly relevant to the design of antitrust policy and other policies that can prevent successful firms from growing at the national level. We document heterogeneous trends across industries and, in some industries, concentration is clearly rising both at the national and local levels. However, our results should provide pause for policy makers who worry about increases in market power. On the whole, and in most industries, large firms are lowering local concentration and, therefore, most likely increasing product-market competition. Carl Shapiro, a former deputy assistant attorney general at the Antitrust Division of the Department of Justice and member of the President's Council of Economic Advisers (CEA) under Barack Obama, makes a similar argument. Discussing evidence on the positive trend in national market concentration, he observes: "So, while these data do reflect the fact that large, national firms have captured an increasing share of overall revenue during the past 20 years in many of these 893 'industries,' they do not, in and of themselves, indicate that the relevant local markets have become more concentrated" (Shapiro 2018). In this paper, we provide the empirical evidence supporting the notion that, in the face of rising national concentration, local markets have indeed become on average significantly less concentrated.[10]

The rest of the paper is organized as follows. Section II describes our data, the way we use the data, and our benchmark measures of national and local concentrations. Section III presents our main four facts and describes their implications. Section IV studies the quality of the NETS data among various dimensions and Section V concludes. An online appendix presents a large variety of additional calculations using other concentration statistics and provides additional detail regarding the data and the results in the main text.[11]

II.   Data and Concentration Statistics

Our analysis uses data from the NETS provided by the firms Walls & Associates and Dun and Bradstreet and comprises annual observations on specific lines of business at unique locations over the 1990–2014 period. In particular, NETS data allow us to observe sales and employment of 8–19 million lines of business each year in our sample. Each line of business is assigned a data universal numbering system (DUNS) identifier that makes

it possible to track its sales and employment over time at the SIC 8 level and at specific latitudes and longitudes. Industries can be mapped into broader SIC 2 classifications or divisions, and locations can be mapped into ZIP codes, counties, or CBSAs. In addition, each line of business is also assigned a headquarters (HQ) number that gives the particular enterprise to which it reports. Thus, the NETS data encompass the universe of establishments operating in the United States, as well as the enterprise to which each belongs, between 1990 and 2014.

To better illustrate the nature of the NETS data, consider the case of Walmart as an example of an enterprise. It is headquartered in Bentonville, Arkansas, and in 2014, it is associated with approximately 4,700 establishments across all 50 states. Each of these 4,700 establishments is assigned its own eight-digit primary SIC code, with 3,718 establishments operating mainly as discount department stores (SIC 53119901), 603 establishments operating mainly as warehouse club stores (SIC 53999906), 241 establishments operating primarily as grocery stores (SIC 54110000), and the remaining establishments scattered mostly across various retail classifications.

Because each establishment in the NETS data is assigned a unique DUNS identifier, it is possible to track when an establishment enters our sample (for those that enter after 1990) and, if applicable, when it exits. In addition, the DUNS identifier follows each establishment over time even if it is sold from one enterprise to another or becomes included in a merger of enterprises, so that sales and employment of particular establishments may be tracked irrespective of corporate-level changes.

Approximately a quarter of enterprises in the NETS data have only one employee. This feature of the data is typically not accounted for by alternative government sources of local employment as estimated by the County Business Patterns (CBP) or the Quarterly Census of Employment and Wages (QCEW).[12] Because these establishments nevertheless report positive sales, we include them in our benchmark analysis. In an online appendix to this paper, we show that our results are robust to excluding enterprises with only 1, fewer than 5, or fewer than 10 employees.

At the two-digit SIC code, the data are classified in terms of 11 divisions, including Manufacturing, Services, Retail Trade, Wholesale Trade, and Finance, Insurance and Real Estate (FIRE), that together account for approximately 85% of sales and 80% of employment in 2014. Because our analysis centers on the relationship between market concentration and the geographic expansion of enterprises, we exclude from our benchmark exercises industries that are intrinsically tied to specific locations because

of weather or endowments of natural resources. These industries include mining; agriculture, forestry, and fishing; construction; and transportation and public utilities. We also exclude from our benchmark analysis any government establishment including establishments belonging to enterprises whose HQs are associated with a public administration SIC code and establishments associated with education, nonprofit endeavors, and central banking.

Throughout the analysis, we consider different levels of industrial and geographic disaggregation. The most basic level of disaggregation we consider is defined as an SIC 8-ZIP code pair. The NETS data cover 18,000 SIC-8 industries and about 40,000 ZIP codes. Because we omit particular industries whose operations have intrinsic ties to geographic endowments, our sample includes 15,305 industries. In each year, we only use SIC 8-ZIP code pairs that have reported both positive sales and positive employment. This leaves us with around 6 million SIC 8-ZIP code pairs for each year on average that we aggregate in different ways. Because we only consider in each year SIC 8-ZIP code pairs that have at least one establishment with positive sales and employment, the number of industry-geography pairs at a given level of aggregation (e.g., SIC 4-County) can vary from year to year. Below and in the online appendix, we show that our results are robust to exercises that only consider industry-geography pairs that have at least one establishment with positive sales and employment in every year. In the latter exercises, the number of industry-geography pairs is constant across time.

Finally, a key advantage of NETS is that it allows researchers to bypass restrictive confidentiality rules accompanying Census micro data. For example, NETS allows researchers to study the role of top firms, such as Walmart or Cemex, something not feasible when working with Census data. As we show below, this feature of NETS allows us to highlight the key role of large firms in driving the diverging trends between national and local market concentration measures. In Section IV, we explore the quality of the NETS data set along various dimensions. We establish that, once appropriately confined to the sample of industries used in this study, NETS compares favorably with the Census data.

Establishments in our data set are indexed by industry, i, location, ℓ, and year, t. Industries are defined by SIC 8 codes. Locations are defined by a latitude-longitude pair. We denote collections of industries into broader classifications (e.g., SIC 2 or divisions) by d. We denote collections of locations into broader geographies (ZIP codes, CBSAs, counties, states, or the whole United States) by g. When defining locations at the CBSA

level, counties that are not within CBSAs are not represented, which amount to 5%–10% of establishments in any given year.

Let $S_{e,i,\ell,t}^{I,G}$ denote the nominal sales of enterprise e in industry i at location ℓ in year t, and $S_{e,i,g,t}^{I,G} = \Sigma_{\ell \in g} S_{e,i,\ell,t}^{I,G}$ its sales in the broader geography g (i.e., the sum of all its establishments' sales across all latitude-longitude pairs ℓ in geography g). The index I refers to the industrial level of aggregation (i.e., by SIC 2, SIC 4, SIC 6, or SIC 8). The index G indicates the geographic level of aggregation (i.e., by ZIP code level, CBSA level, county level, or the whole United States) that we use to define a location ℓ. We then denote by $s_{e,i,g,t}^{I,G}$ this enterprise's share of all sales in industry i located in geography g at date t for the levels of aggregation I and G. We adopt as our benchmark measure of market concentration the HHI,

$$C_{i,g,t}^{I,G} = \sum_e (s_{e,i,g,t}^{I,G})^2,$$

where $C_{i,g,t}^{I,G} \in [1/N_{i,g,t}^{I,G}, 1]$ is the sales concentration, and $N_{i,g,t}^{I,G}$ the number of enterprises in industry i and geography g at time t. In the online appendix to this paper, we also consider alternative measures of concentration, such as the sales share of the top firm, or the adjusted HHI, and show that all of our findings are robust to these other measures. In particular, to the degree that the number of small firms in an industry differs between NETS and CBP data, and that this difference were to have an increasing trend that materially reduces the lower bound of the HHI, the range of the adjusted HHI index no longer depends on the number of firms.[13]

III.   National and Local Market Concentration: The Facts

We organize the discussion of our findings into four main facts. The first two facts document the diverging trends in national and local concentrations and their importance across sectors and geographic definitions of a "local" market. The third and fourth facts document the role that large firms have played in these trends. As a form of corollary to the last fact, we also present evidence specific to Walmart, a firm that has featured prominently in the debate on the evolution of market concentration.

A.   Fact 1: Diverging Trends on Average

Fact 1 is summarized in figures 1 and 2. Figure 1 shows a weighted average of the change in concentration, $\Delta C_t^{I,G}$, across all industry-geography

pairs (i, g) for different definitions of geography G, namely, ZIP code, county, CBSA, and the whole United States,

$$\Delta C_t^{I,G} = \sum_{i,g} w_{i,g,t}^{I,G} \Delta C_{i,g,t}^{I,G},$$ (1)

where the weights $w_{i,g,t}^{I,G}$ are given by the employment shares of industry-geography (i, g) in aggregate employment in year t, and $\Delta C_{i,g,t}^{I,G}$ denotes the change in market concentration between year t and the first year for which we observe sales in the location-industry pair (i, g). As mentioned in Section II, all findings presented in this paper are robust to excluding enterprises with 1, fewer than 5, and fewer than 10 employees. In part, this is because, by construction, our employment-weighted measures of concentration already assign small weights to industry-geography pairs that contain mostly small enterprises.[14]

As indicated in the 2016 CEA report, Barkai (2020), Gutiérrez and Philippon (2017), and others find market concentration at the national level has been steadily increasing since 1990. However, the exact opposite is true for less aggregated measures of concentration. Figure 1 shows that the more geographically disaggregated the measure of concentration,
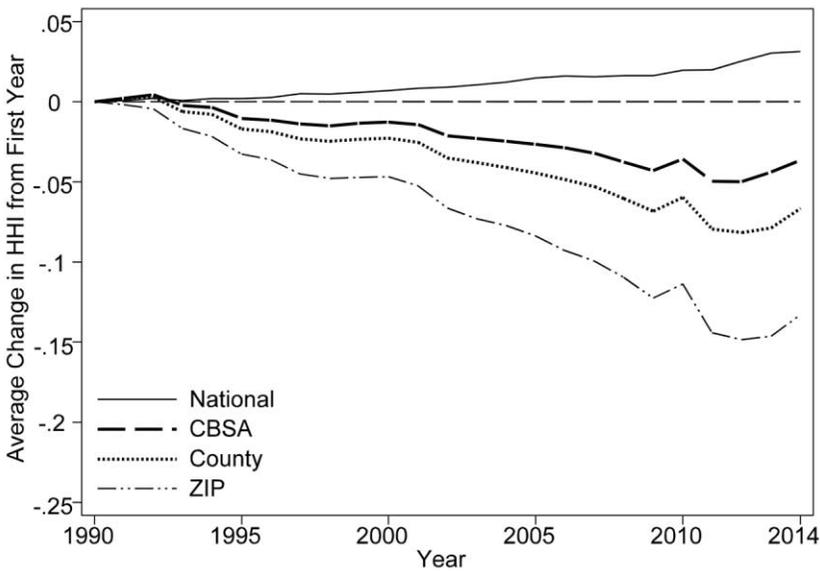

Fig. 1. Diverging economy-wide national and local concentration trends. A color version of this figure is available online.
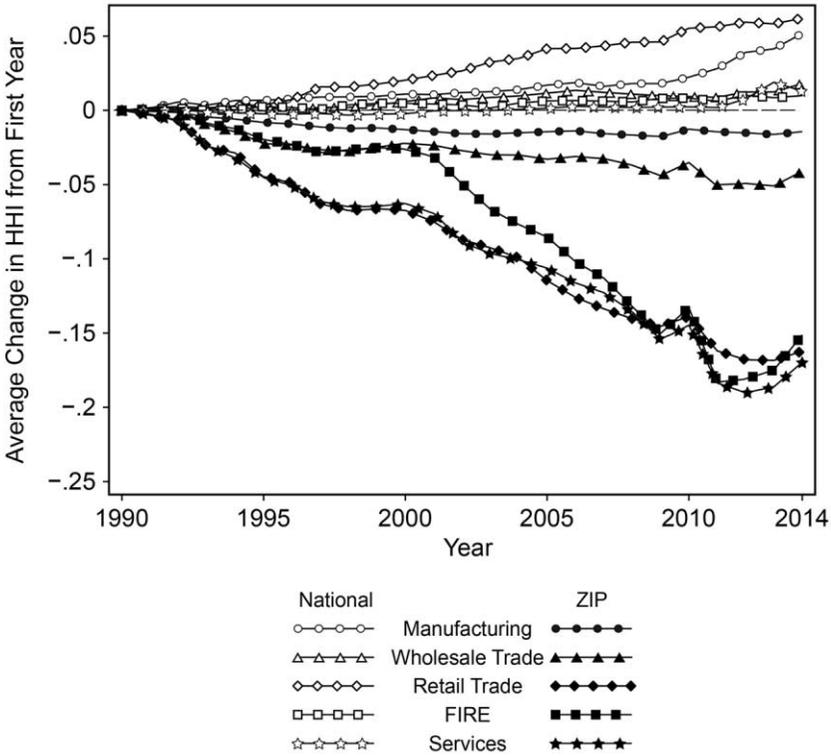
Fig. 2. Diverging division-level national and local concentration trends. HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.

the more pronounced its downward trend over the last two and a half decades.

Figure 2 shows a weighted average of the change in concentration across all industry-geography pairs (i, g) within a particular division, d, namely, Manufacturing, Services, Retail Trade, Wholesale Trade, and FIRE, for geographies defined by ZIP code and the whole United States,

$$\Delta C_{t,d}^{I,G} = \sum_{i \in d,g} w_{i,g,t,d}^{I,G} \Delta C_{i,g,t}^{I,G}.$$

Figure 2 shows that although increasing market concentration at the national level holds broadly across all divisions, it is equally the case that concentration has steadily fallen at the ZIP code level in these divisions. Observe, in particular, that market concentration in the Retail Trade division has been increasing nationally more than in any other division. However, Retail Trade is also among the divisions that show the steepest

decline in concentration at the ZIP code level. This fact is especially striking given that physical retail establishments in our data set are likely to have very local markets.

Concentration by Industrial Classification and Employment

Figure 3 depicts the divergence between national and local concentrations at the ZIP code level for different degrees of industrial aggregation, *I*. This growing divergence between national and local concentrations is most pronounced at the SIC 8 level but clearly present at lower levels of industrial aggregation as well, including the coarsest SIC 2 classification. Thus, we explore below in more detail how these diverging trends between national and local concentrations are related to industrial classification.

Figure 4 repeats the exercise in figure 3 but focuses on employment rather than sales. As the figure shows, using employment rather than

Fig. 3.   Diverging economy-wide trends in sales concentration. HHI = Herfindahl-Hirschman Index; SIC = Standard Industrial Classification. A color version of this figure is available online.

sales is immaterial for the growing divergence between national and local concentrations.[15] In the online appendix, we show that all of our other findings regarding diverging trends between national and local concentrations also hold for employment as well as sales.

In summary, figures 1–4 indicate a growing divergence in national and local concentrations that holds for broad levels of industrial and geographic definitions. In the online appendix, we carry out and present a large number of exercises that highlight the robustness of our findings.[16]

Concentration and Sample Selection

Before proceeding with the analysis and an exploration of the roots underlying our basic fact 1, we discuss an important aspect of this fact related to sample selection. In particular, because we omit in each year industry-geography pairs with no establishments, the resulting unbalanced panel can create situations where an industry-geography pair with
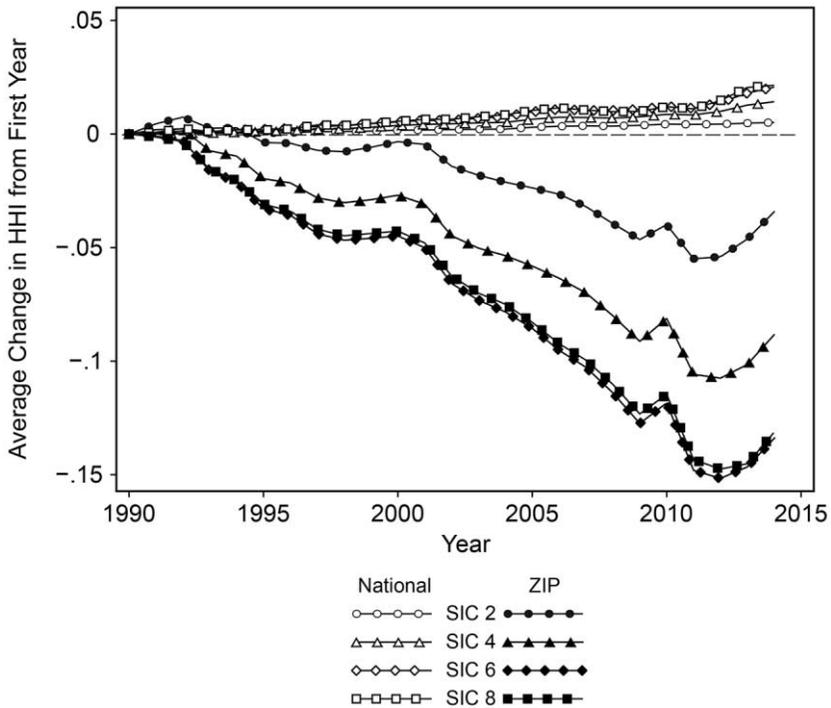

Fig. 4. Diverging economy-wide trends in employment concentration. HHI = Herfindahl-Hirschman Index; SIC = Standard Industrial Classification. A color version of this figure is available online.

a single establishment is dropped from one year to the next. Because the omitted observation is one with a single establishment, and thus associated with high concentration, local concentration decreases simply as a result of losing the observation. Conversely, of course, entry has the opposite effect whereby new establishments in markets without a previous incumbent raise local concentration.[17]

Figures 5 and 6 repeat the exercises in figures 1 and 2 but only considering industry-geography pairs where at least one establishment is present in every year. The resulting panel, therefore, is balanced. Though slightly less pronounced, the divergence between national and local concentration trends remains unequivocal. Furthermore, it is still the case that this divergence becomes more pronounced when moving toward more disaggregated definitions of local markets. It is also still the case that the divergence in concentration trends is particularly evident in service industries, such as Retail and FIRE, which make up the bulk of the US economy.

In the online appendix, we show that these balanced-panel findings also hold for other measures of concentration such as the share of the largest firm or the adjusted HHI. It is worth noting that, for more
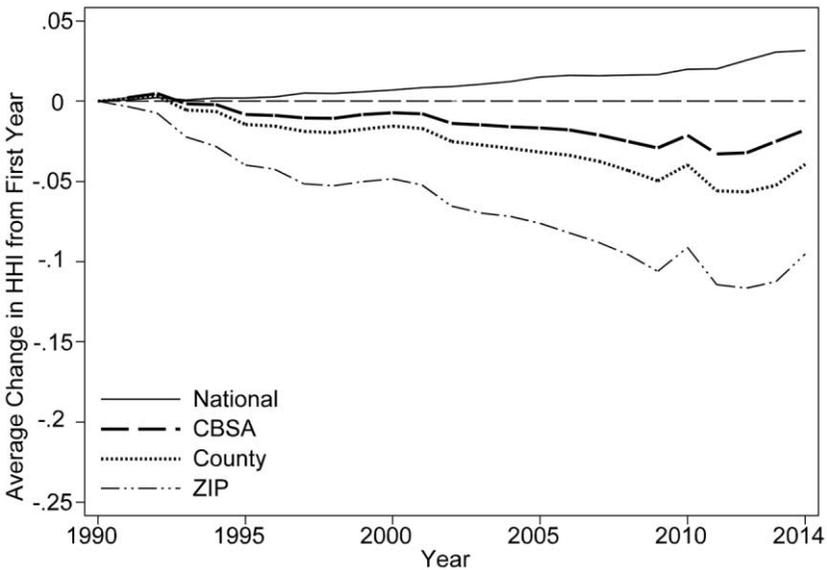

Fig. 5.   Diverging economy-wide national and local concentration trends with a balanced panel. HHI = Herfindahl-Hirschman Index; CBSA = core-based statistical area. A color version of this figure is available online.
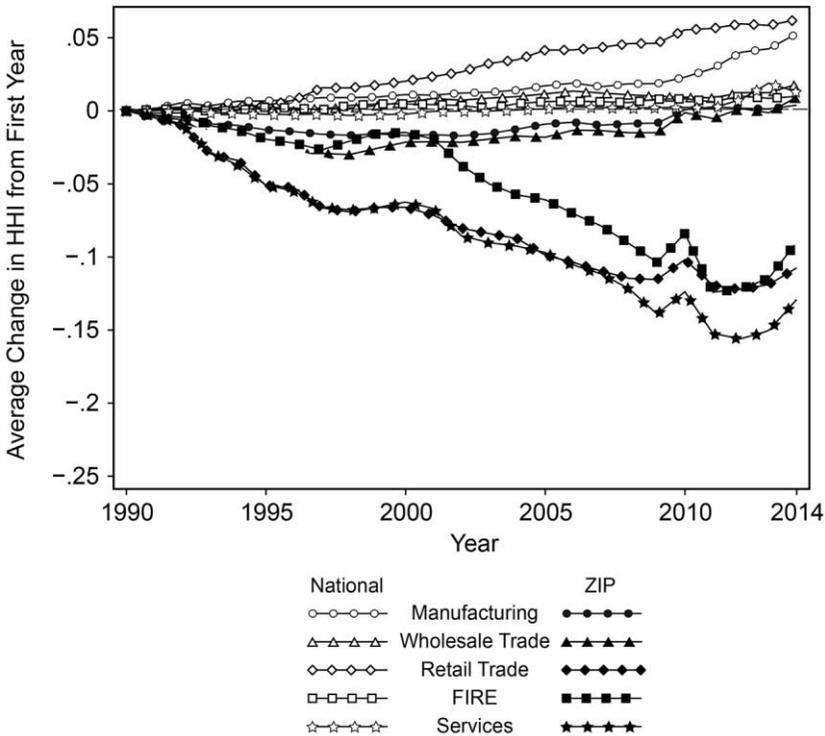
Fig. 6. Diverging division-level national and local concentration trends with a balanced panel. HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.

disaggregated definitions of local markets, measures of concentration based on the sales share of the largest X firms become less informative as X increases. The reason lies in strong selection issues. Consider, for instance, a concentration measure based on the sales share of the top four firms. In that case, measured concentration will necessarily be unchanged in all industry-geography pairs that have four or fewer firms throughout the sample. However, at the SIC 8-ZIP code level, 90% of observations turn out to have three firms or fewer and 93% of observations have four firms or fewer. This case is especially misleading if those pairs are increasingly moving from having one firm to three firms and concentration is actually falling. For example, in the discount department store industry (which includes Walmart), of the ZIP codes that had one firm in 1990 and at least one firm in 2014, 56% had at least two firms competing in 2014 but only 5% of those ZIP codes had more than four firms.

It emerges, therefore, that we have to be cautious when measuring concentration at local levels. Because industry-geography pairs with four or fewer firms represent the large majority of local markets, any study that attempts to measure market concentration in disaggregated sectors and highly disaggregated geographies using the share of the largest four firms faces strong measurement problems. Such studies (e.g., Ganapati 2018) do not challenge the results in our paper or their interpretation.

B.   *Fact 2: Pervasive Diverging Trends*

Fact 2 is presented in figure 7. Within each SIC 2 classification, the figure gives a breakdown of employment in industries with different market concentration trends. In particular, for a given SIC 2 classification, the height of each bar gives the percentage of employment in all industries within that classification that have rising market concentration at the national level between 1990 and 2014. For each SIC 8 industry i within an SIC 2 classification, we compute in each year $\Delta C_{i,t}^{I,G} = \Sigma_g w_{i,g,t}^{I,G} \Delta C_{i,g,t}^{I,G}$, where both g and G denote the whole United States, and regress $\Delta C_{i,t}^{I,G}$ on t. The height of the bar then represents the percentage of labor, within that SIC 2 and across all years, employed in all SIC 8 industries with positive national concentration time trends. Thus, the major part of US employment resides in industries with rising national concentration across all SIC 2 classifications. Within a bar associated with a given SIC 2 classification in figure 7, the colors red, blue, and black represent, respectively,
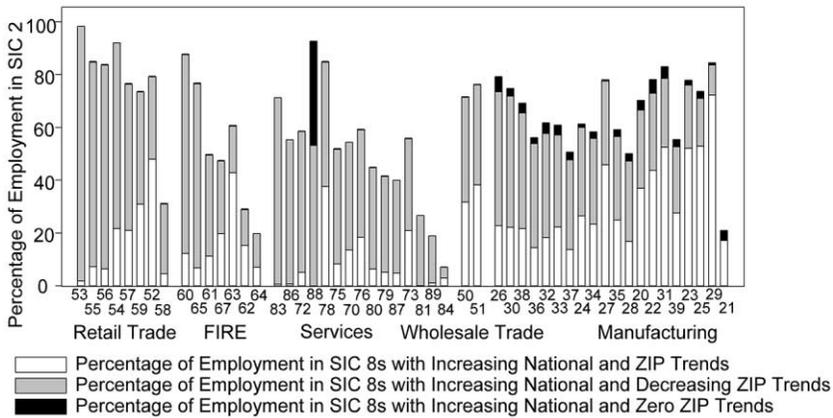

Fig. 7.   Pervasive diverging trends across two-digit sectors. SIC = Standard Industrial Classification. A color version of this figure is available online.

the percentage of employment that resides in industries with declining, rising, and flat market concentrations at the ZIP code level.[18]

Figure 7 shows the pervasiveness of SIC 8 industries with diverging trends.[19] That is, a substantive share of employment resides in industries with rising market concentration at the national level and declining market concentration at the ZIP code level. It also shows the heterogeneity in this share across SIC 2 divisions. For example, in SIC 2 53, which includes General Merchandise Stores, virtually all employment resides in SIC 8 industries with diverging trends (96.38%). In contrast, in SIC 2 21, which includes Tobacco Products, none of the SIC 8 industries exhibit a positive national trend and a negative local trend. Diverging trends are more pronounced in Retail, FIRE, and Services than in Wholesale Trade and Manufacturing, though still very much present in the latter two divisions.

The proportion of aggregate US employment located in all SIC 8 industries with increasing national market concentration and decreasing ZIP code level market concentration is 43%. Thus, given that some industries have also had declining concentration at both the national and ZIP code levels, 78% (or over three-fourths) of US employment resides in industries with declining local market concentration.[20]

C.   *Fact 3: The Role of Top Firms*

Fact 3 explores the contribution that top firms in terms of sales share have made to the diverging trends in each SIC 8 industry. Figures 8 and 9 focus on just those industries whose market concentration has increased at the national level since 1990, represented by the height of the bars in figure 7. Those industries account for roughly half of all industries in our sample, 61% of aggregate US employment, and 67% of aggregate sales.

Within that set of SIC 8 industries, figure 8 focuses on those that exhibit negative local concentration trends. These industries account for 72% of total employment in industries with positive national trends (66% of sales). The figure presents in solid orange and solid red, respectively, the national HHI and the local ZIP code level HHI among these industries. Given our industry selection, the national concentration (orange) line is increasing by construction and the local concentration (red) line is decreasing by construction. The dashed orange and dashed red lines in that figure depict the same objects but exclude the top enterprise in each SIC 8 industry as measured by sales in 2014.[21] We consider only
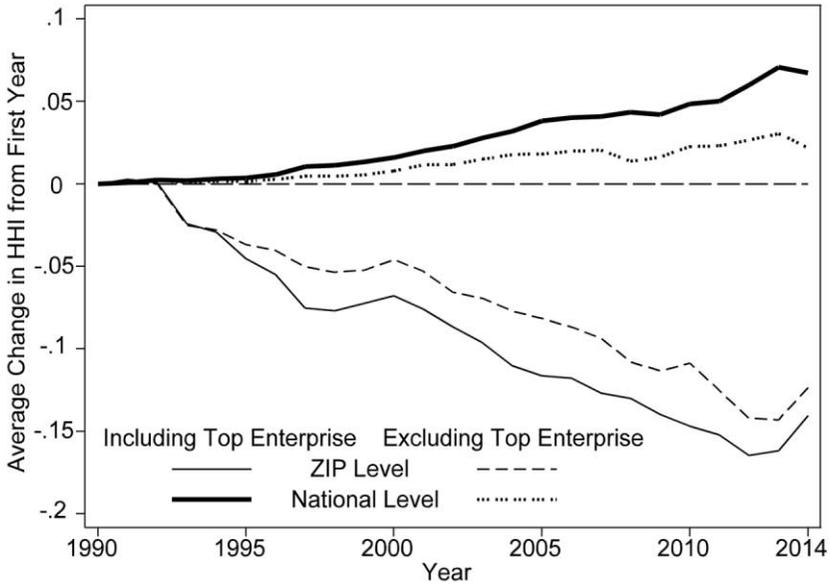
Fig. 8. The role of top enterprises in national and local concentration trends in diverging industries. HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.
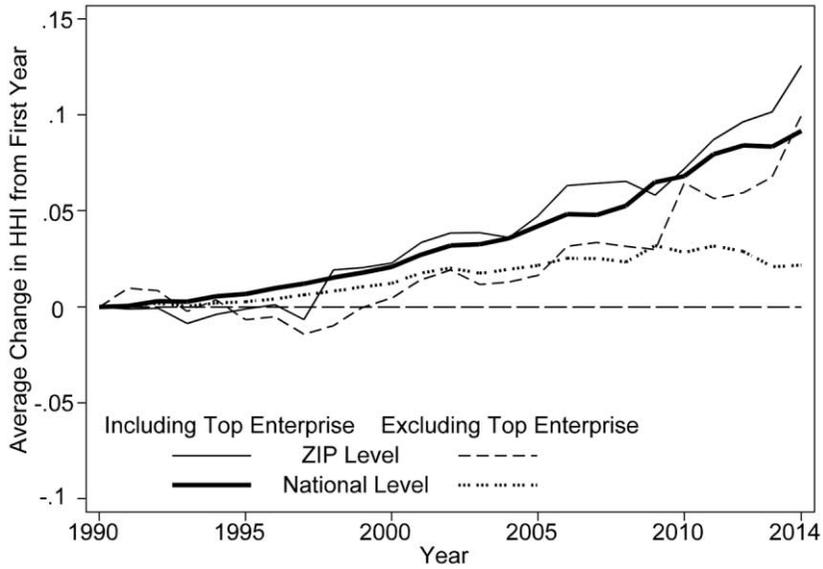

Fig. 9. The role of top enterprises in national and local concentration trends in concentrating industries. HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.

industry-geography pairs (i, g) for which i's top enterprise has at least one establishment present in g in at least 1 year. Furthermore, because we are interested in isolating the effect of the top enterprise on market concentration, among those remaining industry-geography pairs, we then only include observations (i, g, t) where at least one establishment remains after dropping the top enterprise in i and its associated establishments.[22]

Figure 8 shows that among SIC 8 industries with diverging trends, excluding the top firm results in a national concentration trend that is less pronounced. The fact that large firms have contributed to the national increase in concentration is as expected. More surprising is the observation that the top firms have also contributed to the decline in local concentration. Figure 8 shows that when we exclude the top firm, the negative trend in ZIP-code-level concentration is less pronounced. Hence, the top firm (and more generally the largest firms) in an industry are responsible (though not entirely) for the diverging trends.

Figure 9 is constructed exactly as figure 8 but uses the SIC 8 industries with increasing national trends that are not depicted in figure 8. In other words, it uses the SIC 8 industries with positive national and local trends. The figure shows that for this set of industries, excluding the top firm lowers both the national and the local trends in concentration. Over the last 10 years or so, it also shows that excluding the top firm reduces the trend in national concentration significantly more than that in local concentration.

How can the growth of large firms contribute to the divergence in these trends? To a large extent, top enterprises expand by adding new establishments in new locations. The new establishments tend to decrease local concentration as they compete with existing establishments in the area, even as the top firm acquires a larger national market share, increasing national concentration. Next, we explore the impact of local entry by a top firm.

Comparing Industries' Largest Firm to Their Runner-Ups

To the extent that lower concentration is associated with more competitive markets, the findings in this paper are suggestive of local markets becoming more competitive despite concentration rising at the national level. Our analysis is indeed consistent with the notion that in many industries, the top enterprise expands into new markets by opening plants that compete with already established local monopolists. The case for increasing competition, however, is less clear if the observed fall in concentration is the result of a few firms entering several markets. As discussed

in Bernheim and Whinston (1990) and Bond and Syropoulos (2008), when firms compete in multiple markets simultaneously, the potential for collusion can grow because these firms' ability to punish any deviation can be enhanced by their multiple "contacts" across markets. Hence, increasing national concentration resulting from the increasingly large positions of two or three enterprises in an industry can result in declines in local concentration, more local contacts between competitors, and a rise in the ability to collude and thus the effective market power of the largest firms. If, in contrast, increasing national concentration results from the gradual expansion of a single top firm competing with local firms, a decline in local concentration will be associated with reductions in market power in those local markets.

To gain insight into the role of the largest enterprise in a given industry relative to that of the largest two or three enterprises, figure 10 repeats the exercise in figure 8 but excludes the second and third largest enterprises instead of the top enterprise. For industries where national and local concentration trends diverge, excluding the second and third largest enterprises results in an increase in concentration at the local level as in figure 8. Thus, as with the top enterprise, when the second and third largest enterprises enter new geographical markets, local concentration falls.
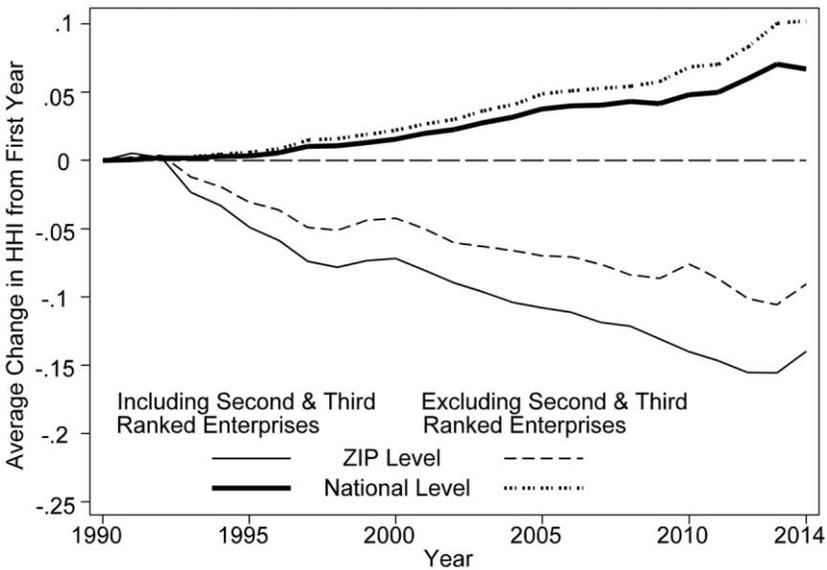

Fig. 10.   The role of the second and third largest enterprises in diverging industries. HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.

However, unlike figure 8, excluding the second and third largest enter-
prises increases national concentration. Put another way, unlike the top en-
terprise, the second and third largest enterprises contribute to reducing
concentration at the national level. This finding is inconsistent with the
view that the largest two or three enterprises are responsible for a simul-
taneous rise in national concentration and decline in local concentration
as they expand in new untested markets. Instead, figure 8 shows that entry
of the second and third largest enterprises leads to overall declines in con-
centration as with any other less dominant firm.

Analogous to figure 10, figure 11 repeats the exercise in figure 9 for
cases where both national and local concentrations have been rising but
excludes the second and third largest enterprises instead of the top enter-
prise. Comparisons with figure 9 make it even more apparent that the
second and third largest firms have an impact that on average differs from
that of the most dominant enterprise across industries. In figure 11, we see
that the second and third largest enterprises contribute to lowering con-
centration both at the national and local levels whereas the most domi-
nant enterprise in figure 9 contributes to higher concentration nationally.

Figure 12 helps further contrast the way in which, across industries,
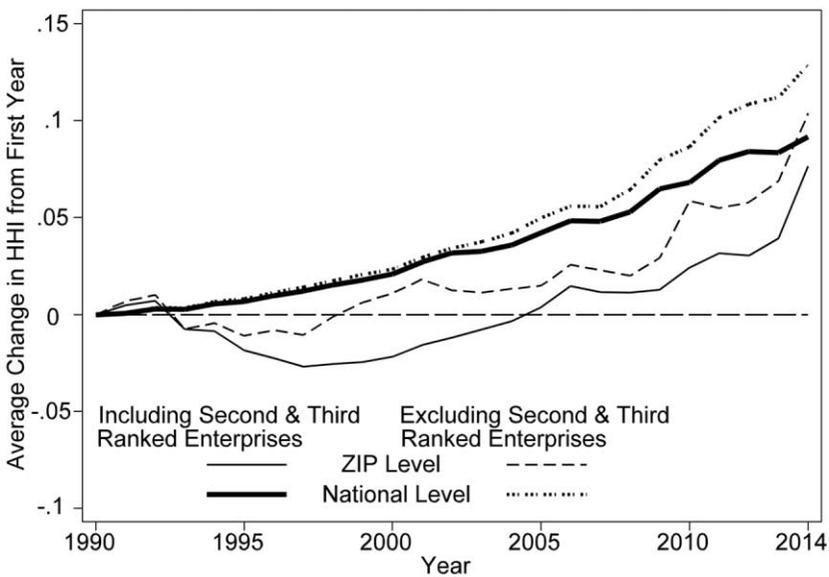the dominant enterprises have expanded geographically relative to the

Fig. 11.   The role of the second and third largest enterprises in concentrating industries.
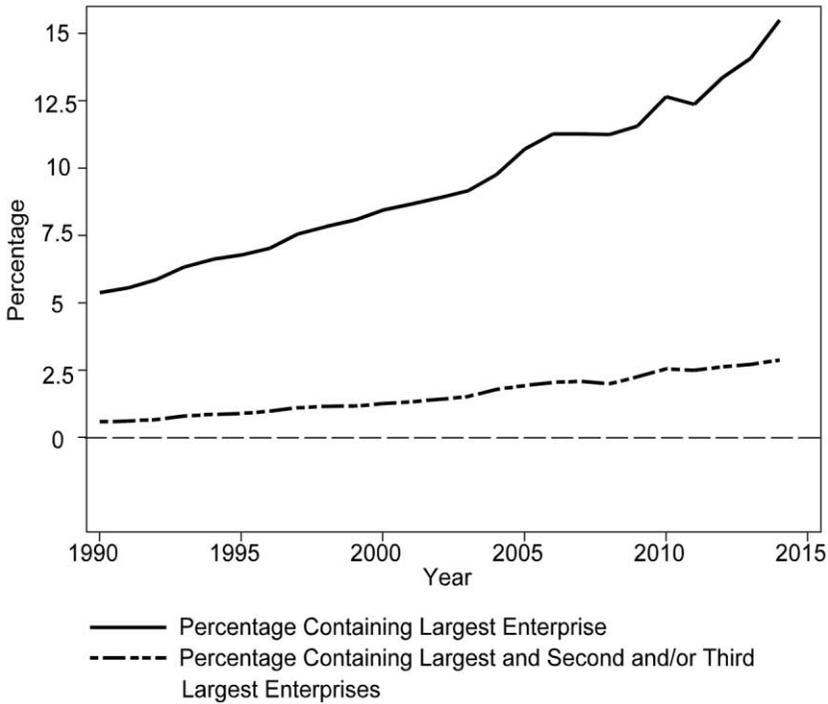HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.

Fig. 12. Expansion of top enterprises into ZIP codes. A color version of this figure is available online.

next two largest enterprises. Specifically, the solid line in figure 12 shows the proportion of SIC 8-ZIP code pairs, weighted by employment associated with that pair, where the dominant enterprise has at least one establishment. This proportion steadily increased from 5.4% in 1990 to 15.5% in 2014. In other words, on average across industries, the largest enterprise has unambiguously and steadily expanded into new local markets over the last 25 years. The dashed line in figure 12 depicts the proportion of SIC 8-ZIP code pairs where not only the largest enterprise but also the second and third largest enterprises have at least one establishment. Although the dashed line has gradually increased over the last 25 years, it has done so at a considerably slower rate than the solid line. Put differently, the difference between the two lines represents the proportion of SIC 8-ZIP code pairs in the United States where the top enterprise is competing with smaller firms rather than its next two largest competitors, and this difference has itself gotten markedly larger over the last 3 decades.

D.   Fact 4: When a Top Firm Comes to Town

To further illustrate the impact of an industry's top enterprise on market
concentration at the local level, figures 13 and 14 present an event study
describing the effect of local entry by an establishment associated with
a top firm (defined by 2014 sales in an SIC 8 industry as in fact 3) in a
ZIP code. Specifically, figures 13 and 14 examine the effect of a top firm
opening a new establishment in a ZIP code on local market concentra-
tion. The calculations here mimic those in figures 9 and 8. In figures 13
and 14, the *x*-axis plots a 10-year window surrounding a top firm estab-
lishment opening in a given ZIP code, with 0 denoting the opening year.
To better highlight the net effect of entry on concentration, we normalize
the change in concentration to zero in the year prior to the establishment
opening.
    Figure 13 depicts the event study for all SIC 8 industries with increas-
ing market concentration at the national level and decreasing local market
concentration, that is, SIC 8 industries with diverging trends. Figure 14
illustrates findings for the remaining SIC 8 industries with increasing
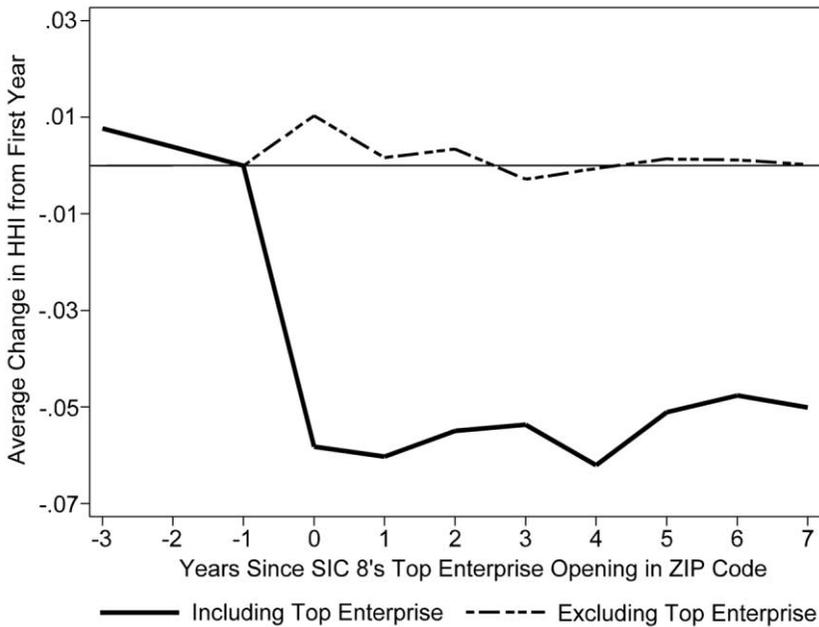

Fig. 13.   Effect on concentration when a top enterprise enters a local market in diverging
industries. HHI = Herfindahl-Hirschman Index; SIC = Standard Industrial Classification.
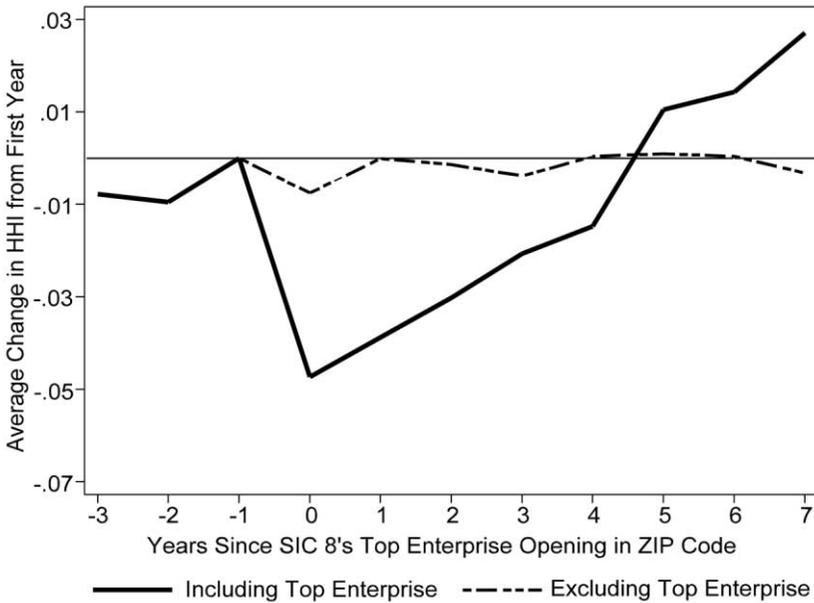A color version of this figure is available online.

Fig. 14. Effect on concentration when a top enterprise enters a local market in concentrating industries. HHI = Herfindahl-Hirschman Index; SIC = Standard Industrial Classification. A color version of this figure is available online.

national concentration: those where both national and local trends are positive over our sample period. The solid lines in both figures present the evolution of the HHI when the entering establishment is included; the dashed lines illustrate the same object when excluding the opening establishment owned by the top enterprise within each industry.

Among industries with diverging trends, the opening of an establishment in a ZIP code is associated with a fall in market concentration. Moreover, this fall persists at about the same size for at least 7 years after the event. In contrast, among industries with increasing local market concentration, the opening of an establishment leads to a temporary decrease in market concentration but one that reverses quickly. After 4–5 years, concentration is higher than it would have been absent the opening. Hence, in the former case, the establishment owned by the top enterprise does not become dominant, whereas in the latter case it eventually dwarfs the establishments of other firms. The data suggest that, on the whole, the case where the top firm does not become dominant at the local level is markedly more relevant.[23]

The dashed lines in both figures 13 and 14 suggest that when all shares are recalculated excluding sales of the opening establishment belonging

to the top enterprise in each industry, market concentration does not exhibit a significant trend over the entire 10-year window. Thus, the dashed lines lend credibility to a central assumption underlying the event study, namely, that entry by a top enterprise in a local market is the main event affecting concentration in each market.

The Case of Walmart

The event study presented in fact 4 averages the effect of entry by a top enterprise across many markets. It is informative, therefore, to further delve into the data within a particular sector. In the last couple of decades, one of the most widely studied cases of an expanding firm has been the case of Walmart.[24] Hence, here we repeat the calculations underlying fact 4 but for the particular case of Walmart and the SIC 8 industries with which it is associated. The solid line depicted in figure 15 represents a weighted average of concentration within Walmart's primary industry (discount department stores) across all ZIP codes. The dashed line represents the same object but excludes the opening establishment owned by

Fig. 15.   Effect on concentration when Walmart enters a local market. HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.

Walmart (i.e., all shares are recalculated excluding Walmart's sales from the new establishment).

Our findings for Walmart are qualitatively similar to those in fact 4 for industries with diverging trends (as is the case for Walmart's industries). Absent a Walmart opening, there is no trend in concentration, but there is a significant fall in the HHI of a ZIP code in which Walmart opens a new establishment. This lower level of concentration remains about constant for at least 7 years.

One advantage of considering a particular firm and its industries is that we can also show, and easily interpret, the effect of entry on the number of establishments in the local market. To do so, figure 16 illustrates the effect of a Walmart establishment opening in a given ZIP code on the number of establishments in that ZIP code. The solid line in the figure indicates that, when averaged across all ZIP codes (weighted by geography-SIC 8 employment, as in all other figures), the opening of a Walmart establishment is associated with an increase in the number of local establishments. This increase is somewhat less than one for one (roughly 0.75), which suggests that the entry of Walmart is associated with some establishment exits across ZIP codes. Consistent with this observation,

Fig. 16. Effect on number of establishments when Walmart enters a local market. A color version of this figure is available online.

the dashed line indicates that when the newly established Walmart is ex-
cluded from the calculation, the number of establishments falls some-
what across ZIP codes.[25]

The Case of Cemex

Figure 7 suggests that a very high share of employment in Retail Trade
resides in industries with diverging national and local trends, while this
phenomenon is much less prevalent in Manufacturing and Wholesale
Trade. However, the sector level of aggregation presented in figure 7
obscures considerable heterogeneity within industries in a given sector.
It is still the case that many manufacturing industries have diverging
trends and see declining local concentration following the arrival of their
largest enterprise in a ZIP code. To use one example, figures 17 and 18
highlight the SIC 8 code 32730000, Ready-Mixed Concrete, whose top
enterprise by sales in 2014 is Cemex, a building materials company. Fig-
ure 17 shows that the arrival of Cemex into a ZIP code reduces concen-
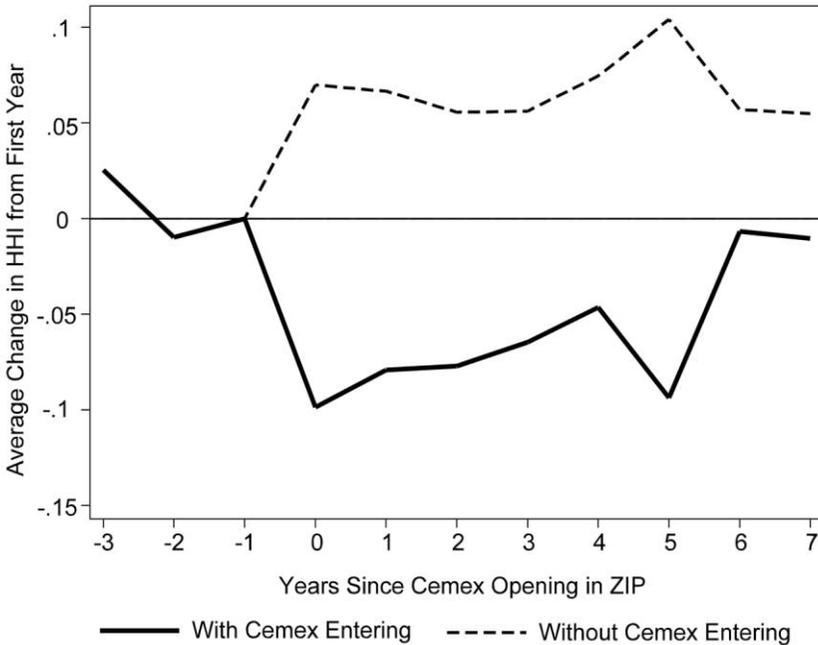tration in its industry by about 0.1. Although this effect dissipates after

Fig. 17. Effect on concentration when Cemex enters a local market. HHI = Herfindahl-
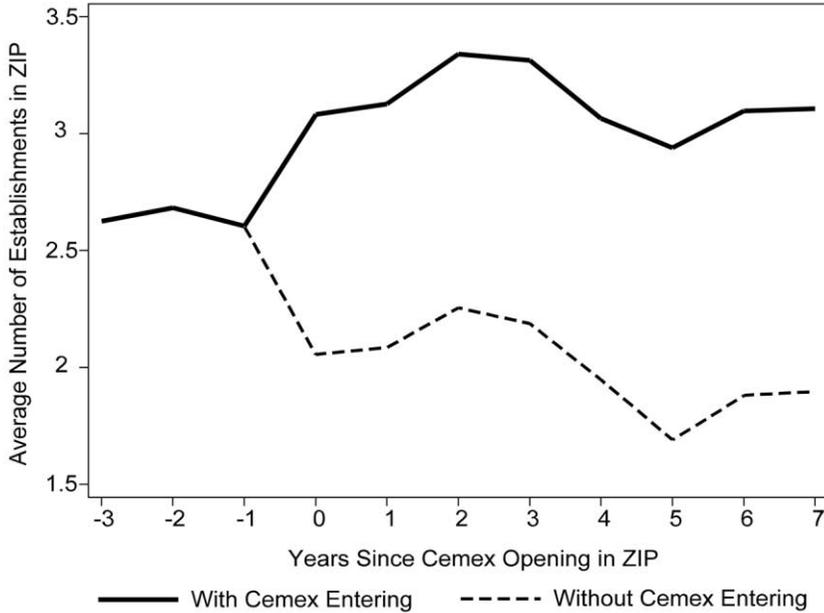Hirschman Index. A color version of this figure is available online.

Fig. 18. Effect on number of establishments when Cemex enters a local market. A color version of this figure is available online.

7 years, concentration measured excluding Cemex remains higher than it otherwise would when included so that this company is still contributing to lower local concentration. Figure 18 shows that, as with the case of Walmart, although some existing establishments do exit when Cemex opens a plant, the overall number of establishments in the ZIP-industry pair rises on average. Although Syverson (2008) documents increasing national concentration within this industry, consistent with our findings, Syverson (2004, 2008) also argues that high transport costs make local measures of concentration more relevant. In this paper, we show that these more local measures exhibit a downward trend.

IV.   The NETS Data

One important advantage of the NETS data is that it covers every establishment in the United States at an exceptionally high level of disaggregation both by industry and geographic area. Unlike the comparable microdata available from the Census Bureau that produce the CBP data, NETS does not require that a research proposal be approved describing how the data are to be used. It also does not require that an approved

researcher travel to the location of a Federal Statistical Research Data Center (FSRDC) for secure access or compliance with the disclosure process to protect sensitive information. NETS data only require a subscription fee and can be easily accessed on any machine without undergoing a formal review process.

A critical feature of the NETS data is that NETS allows researchers to examine and illustrate the impact of individual enterprises, such as Walmart in the discount department stores industry, or Cemex in the ready-mixed concrete industry. This feature of NETS is integral to our analysis in that it permits us to explore and disclose the extent to which findings on concentration are driven by specific and large enterprises in individual industries. This defining characteristic of NETS, which we exploit in this paper, thus permits explorations that would otherwise be infeasible with Census data.

Evidently, to the degree that NETS allows us flexibility not permitted with Census data, it is important to benchmark how the two data sets compare. Barnatchez et al. (2017) note that NETS includes many non-employer establishments not covered by the CBP, which tend to be very small establishments. When removing establishments with one employee or fewer than five employees, they find that overall trends in employment and establishments counts are closely aligned with the CBP. They suggest, therefore, verifying that findings using NETS data are robust to these sample restrictions. Barnatchez et al. (2017) also observe that differences between NETS and Census data are largely related to discrepancies in Agriculture, Mining, and Construction. In particular, in the latter two sectors, NETS appears to not have captured the full extent of recent employment changes. These include changes resulting from the boom-bust cycles associated with the shale oil and gas expansion in the early 2000s for mining and the bursting of the housing bubble in 2007 for construction. As mentioned above, our analysis excludes these sectors in any case because their activity is intrinsically tied to local geographic characteristics.

To get an idea of the differences between NETS and the CBP, figure 19 illustrates standardized (i.e., set to 1 in 1990) aggregate employment in the NETS database and the CBP. Unlike Barnatchez et al. (2017), we remove from both data sets the set of industries described above and, thus, we are restricted to the five major sectors used in this study: FIRE, Manufacturing, Retail, Services, and Wholesale Trade. Consistent with their observations, in the NETS data, we plot standardized employment when including all enterprises as well as when excluding, in each year,
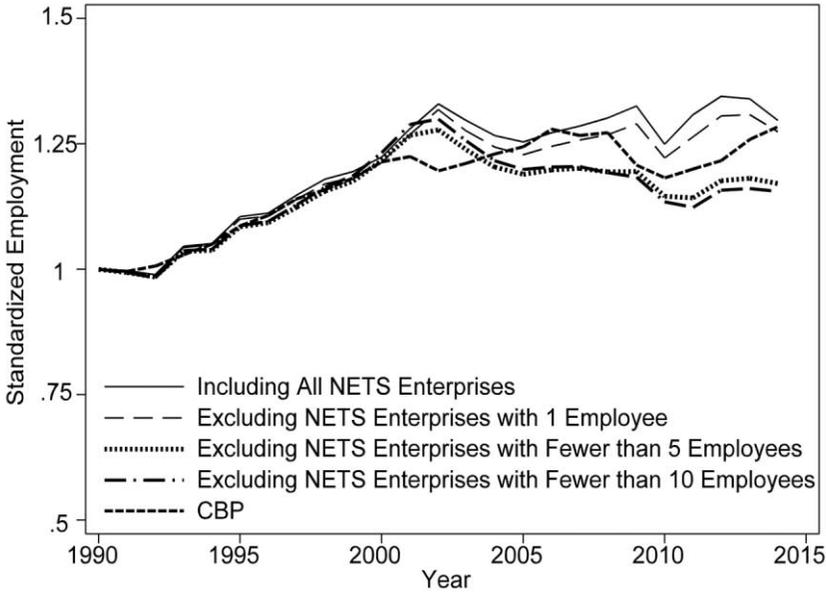
Fig. 19. Standardized national employment in County Business Pattern and National Establishment Time Series data. A color version of this figure is available online.

enterprises with 1, fewer than 5, and fewer than 10 employees. As shown in the figure, the NETS data line up almost identically with the CBP data up to around 2002.[26] Small differences arise after that year though all series appear to flatten out. Of note, almost throughout the sample, CBP employment lies in between employment excluding one and fewer than five employees in the NETS data. The difference in the sampling of small firms between NETS and the Census noted in Barnatchez et al. (2017), therefore, appears bounded by these two cases. In an online appendix, we show that all findings in this paper hold for all NETS cases shown in figure 19. Moreover, as described above, all weighted average estimates in this study are weighted by employment so that, by construction, any differences in the sampling of small firms after 2002 are also given small weight. Observe also that higher-frequency changes in Census data, such as the dip in employment following the Great Recession, are present in the various NETS cases shown in figure 19. Evidently, differences in sampling between NETS and the Census manifest themselves mainly as a level effect after 2002.

Although differences between NETS and the CBP primarily result from the sampling of small firms, a question arises as to whether these

differences might have grown over time. To explore this question, figure 20*a* illustrates the cross-sectional correlation between CBP and NETS total employment across counties in each year of our sample, for the five major sectors used in this study: FIRE, Manufacturing, Retail, Services, and Wholesale Trade. The correlation is high at above 0.98 in every year irrespective of the definition we adopt for the NETS data (i.e., enterprises with 1, fewer than 5, and fewer than 10 employees). More importantly, to the extent that differences exist, for the set of industries we consider, there are no obvious time trends in those differences. The CBP data allow us to construct these correlations industry by industry only at the county level, where these are very close, but not at the ZIP code level. At the more geographically disaggregated ZIP code level, the CBP only reports aggregate ZIP code employment without any industry breakdown. Consequently, we are not able to remove particular industries such as Agriculture, Mining, or Construction when comparing ZIP code level data between NETS and the CBP. However, even with those industries included, figure 20*b* shows that the correlation between ZIP code employment in NETS versus the CBP remains above 0.85 in every year. As with the county-level data, to the extent that this correlation is not exactly 1 and to the extent that differences exist between the two data sets, there is no trend in the way that ZIP code employment differs between NETS and the CBP.

In summary, our findings are consistent with those of Barnatchez et al. (2017) who find differences between NETS and Census data related to the sampling of small firms. As the authors suggest, these differences appear to be bounded by exercises that remove small firms. Specifically, we find that standardized CBP employment is bounded by cases that remove firms with one and fewer than five employees in the NETS data. Moreover, our analysis removes industries identified by Barnatchez et al. (2017) as those least closely matching employment in the CBP, though we remove them for different reasons as explained above. Finally, although there appears to be an increase in the difference between CBP and NETS employment starting in 2002, this discrepancy emerges mainly as one time change with no visible trends after 2002. All of these observations, therefore, suggest that any findings related to aggregate or industry-wide estimates that we discuss above cannot be driven by the scope or coverage of the two data sets.
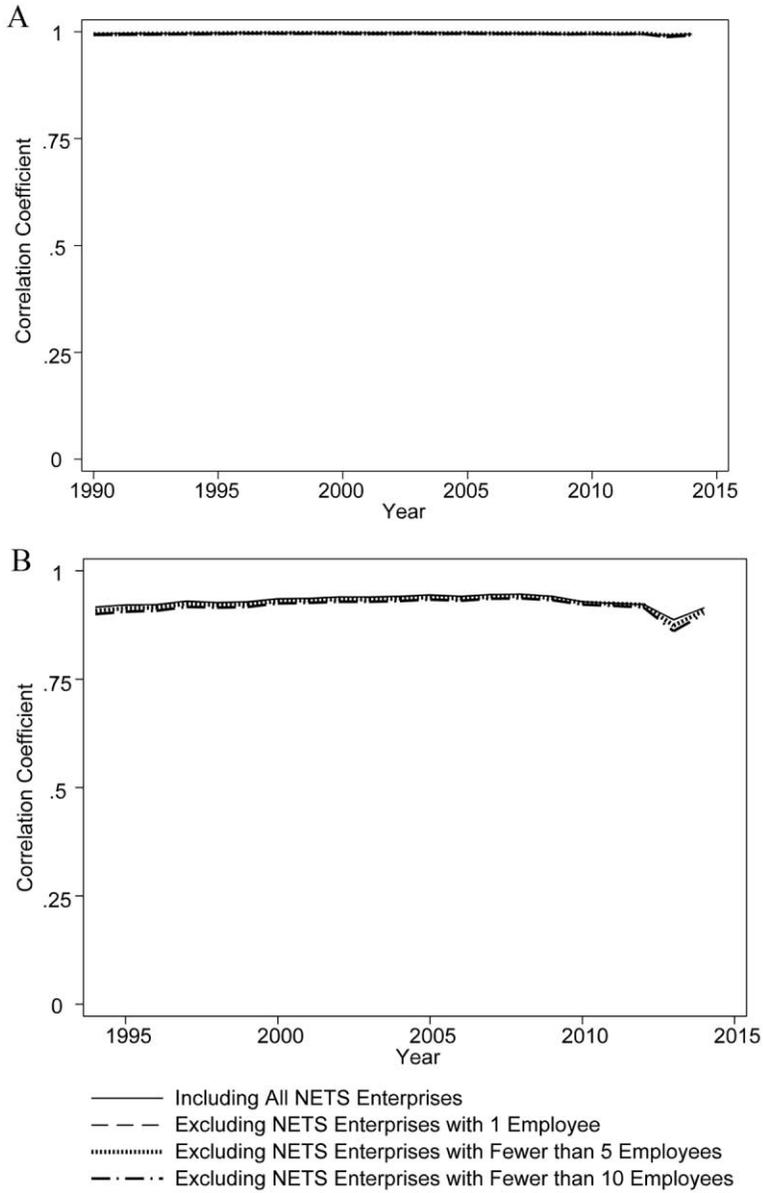
Fig. 20. County-level (*a*) and ZIP-level (*b*) correlations between National Establishment Time Series and County Business Pattern employment. HHI = Herfindahl-Hirschman Index. A color version of this figure is available online.

V. Conclusions

We have shown by way of four main facts that the increase in market concentration observed at the national level over the last 25 years is being shaped by enterprises expanding into new local markets. This expansion into local markets is accompanied by a fall in local concentration as firms open establishments in new locations. These observations are suggestive of more, rather than less, competitive markets.[27]

The findings in this paper potentially help reconcile the observation of increasing concentration at the national level and the more mixed evidence on increasing markups and profits. Almost no theory of product-market competition associates decreasing concentration with either increasing markups or increasing profits. One exception resides in theories of multimarket collusion where a few firms competing in many markets can have enhanced opportunities to collude. Although this form of collusion could be important in specific industries, we show that an expanding top firm competing with local producers is a much more common occurrence. Thus, our facts indicate that the rising trend in national concentration is not, in and of itself, necessarily a concern for antitrust policy. By decreasing local concentration, the growth of top firms has likely increased local competition in many industries and, therefore, helped improve the quality and reduce the prices of much of what we buy.

Endnotes

1. A 2016 report by the CEA, for instance, finds that the national revenue share of the top 50 firms has increased across most North American Industry Classification System (NAICS) sectors between 1997 and 2012. The report can be found at https://obamawhitehouse.archives.gov/sites/default/files/page/files/20160414_cea_competition_issue_brief.pdf. Gutiérrez and Philippon (2017) show that this increase in US-wide market concentration is not uniform across all sectors and has been most pronounced in nonmanufacturing sectors. Barkai (2020) and Autor et al. (2017) find that the national sales share of top firms has also been rising since 1997 and, in fact, helps explain the decline in the labor share over the same period.

2. Other examples are Azar, Marinescu, and Steinbaum (2019); Benmelech, Bergman, and Kim (2018); and Qiu and Sojourner (2019).

3. Although rising market concentration at the national level is relatively undisputed, the evidence regarding markups is more mixed. De Loecker et al. (2020) show evidence of rising markups since the 1980s among publicly traded firms. However, Traina (2018) points out that the evidence on markups depends crucially on the measurement of variable costs. When variable costs include marketing and management costs, as well as other indirect costs of production, markups have been relatively flat since the mid-1980s. Hall (2018) also finds essentially constant markups at the sectoral level using KLEMS productivity data. Similarly, Karabarbounis and Neiman (2018) find generally flat markups over time when also accounting for selling, general, and administrative expenses. Anderson et al. (2018) focus on the retail sector and find stable markups since 1979 using scanner data on the price of transactions and measuring marginal costs as replacement costs at the store level. Edmond, Midrigan, and Xu (2018) show that when weighted by costs rather than sales, as implied by the microfoundations they lay out, aggregate markups have increased only modestly.

4. In the main text, we focus mostly on ZIP codes as our geographic definition of a local market. An online appendix presents results with other geographic units.

5. This finding also holds when we exclude the top three firms in each industry instead of just the top firm.

6. Jia (2008) studies competition by Walmart and other discount retail stores. She proposes a structural model of this competition and argues that the profits of previously available retailers decrease when "Walmart comes to town." This is consistent with our view that Walmart lowers concentration by taking market share away from local competitors. Moreover, the exit of firms we observe is also consistent with those observed by Jia (2008) when measured at the county level. Holmes (2011) studies the expansion strategy of Walmart and, in particular, its geographic expansion strategy. Our findings are exactly consistent with this view of geographic expansion and provide related facts concerning its impact on local concentration. In contrast to these studies, our empirical findings extend to most US industries in addition to the discount retail sector.

7. This industry was singled out in Syverson (2008) as an example of an industry with a local market.

8. Berger et al. (2019) also develop an equilibrium model of the US labor market and find that, although there are large welfare gains from increasing competition, in their framework market power is unable to explain the decline in the labor share.

9. Throughout the paper, we interchangeably use the terms "plant" and "establishment." We also treat firm and enterprise as synonymous.

10. De Loecker and Eeckhout (2018) also argue that to measure concentration in a way that is meaningful as an indicator of market power, this measurement has to be carried out for specific goods and local markets using the universe of firms. This is exactly what we do in this paper using the NETS data.

11. The online supplementary appendix to this paper is available at http://www.princeton.edu/~erossi/DTNLC_Appendix.pdf.

12. Many enterprises with one employee are nonemployer enterprises or, in other words, have no paid employees. Although employment at those enterprises may at times be the result of imputations, Barnatchez et al. (2017) show that taking out those imputations leaves measures of local employment that are generally highly correlated with those in the CBP across industries.

13. The adjusted HHI is given by $\tilde{C}_{i,g,t}^{I,G} = \frac{\left[C_{i,g,t}^{I,G} - \left(1/N_{i,g,t}^{I,G} \right) \right]}{\left[1 - \left(1/N_{i,g,t}^{I,G} \right) \right]} \in [0,1]$ when $N_{i,g,t}^{I,G} > 1$ and $\tilde{C}_{i,g,t}^{I,G} = 1$ when $N_{i,g,t}^{I,G} = 1$.

14. Given differences in the number of firms and other industry characteristics, we study changes in the HHI instead of the level of the HHI, so that we can compare trends in concentration across industries. This is why we aggregate changes in the HHI instead of aggregating levels of the HHI. Using sales shares instead of employment shares as weights yields similar results.

15. In the NETS data, establishment sales numbers are more frequently imputed than employment numbers. However, given that the CBP data do not report sales figures, the similarities in national and local concentration trends for sales and employment in NETS are consistent with the notion that, for a given enterprise, increasing sales by opening new establishments in local markets requires hiring labor in those markets.

16. We also consider county and CBSA geographies, as well as the SIC 4 industrial classification code, highlighting respectively the importance of local markets and well-defined industries.

17. See, e.g., the argument and evidence presented in Ganapati (2018).

18. Specifically, in the calculation of $\Delta C_{i,t}^{I,G} = \Sigma_g w_{i,g,t}^{I,G} \Delta C_{i,g,t}^{I,G}$, both g and G now represent a ZIP code.

19. We reserve the use of the term "diverging trends" for a case of positive national trend and a negative local trend. The case of a negative national trend and a positive local trend is also possible, though much less common in virtually all industries.

20. The share of national sales in sectors with decreasing local market concentration is 72%.

21. We show in the online appendix that we obtain similar results when we exclude the top three firms rather than only the top firm.

22. We also exclude industry-geography pairs whose first year of observed sales results from only one establishment belonging to the top enterprise, because the change in market concentration cannot be computed in that case.

23. Neumark et al. (2006) and Barnatchez et al. (2017) argue that the NETS data set might at times be slow in reporting the entry and exit of small firms. Given their findings, one might question the extent to which our results are driven by the exit of small firms not being reported accurately. However, the fact that the fall in the HHI persists for up to 7 years diminishes this potential concern.

24. See, e.g., Basker (2007); Jia (2008); Zhu, Singh, Manuszak (2009); Ailawadi et al. (2010); and Holmes (2011).

25. Consistent with the findings in Jia (2008) and Basker (2007), carrying out these calculations at the county level reveals a more pronounced effect of Walmart's entry on firm exit. Nevertheless, the decline in the HHI is still large on impact and still negative after 7 years.

26. Barnatchez et al. (2017) also raise the issue of imputation in the NETS. As a practical matter, this issue is a more general one that can arise even in Census data. For example, White, Reiter, and Petrin (2018) indicate that in the 2002 Census of Manufactures, more than three-fourths of observations have imputed data for at least one variable used to compute total factor productivity. For robustness, however, we show in the technical appendix that the results herein are robust to using only nonimputed NETS data, which in this case consist of employment for a subset of establishments.

27. Hsieh and Rossi-Hansberg (2019) show, using Census data, that these and other complementary patterns are particularly pronounced in service sectors. They argue that this evolution is the result of a new "Industrial Revolution in Services" that has allowed top service firms to replicate in space and access smaller, more marginal, markets at a lower cost.

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